FOREST RESEARCH DIGEST

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TEMPERATURES IN PLANTING FURROWS

The relative merits of planting forest tree seedlings in furrows and in normal unworked soil have been pointed out many times on theoretical grounds. Both methods have certain factors to recommend them, and each has its own particular disadvantages. One of the disadvantages generally attributed to furrows is that the bare mineral soil becomes excessively hot on the surface. High temperatures in the region of the root collar are often fatal to young seedlings and this has been a strong argument against furrow planting.

Actual tests of the temperatures in furrows and in unworked soil adjacent to the furrows were made on the Huron National Forest by P. O. Rudolf. These tests show that the furrows are not so hot as reputation has made them out to be. Thirty-six observations of soil surface temperatures were made at noon. The thermometers were placed so that they were not shaded. The temperatures were taken simultaneously in furrows and in unworked soil immediately adjacent. The table shows the average temperatures in these situations on days of different degrees of cloudiness.

Condition	Average temperature of soil surface in degrees Fahrenheit		Basis Number Observations
	In the furrow	In unworked soil beside the furrow	
Clear days	85.9	90.9	11
Partly cloudy days	83.0	86.0	12
Overcast days	63.0	63.5	13
All measurements	77.2	79.4	36

It is apparent that the furrows are cooler than the unworked soil, especially on hot days when the temperature approaches a critical point. The difference on clear days would have been even greater if it had not been necessary to discard several pairs of observations because the thermometers used did not register accurately above 130° F.

Out of the thirty-six observations there were eight in which the temperatures in the furrows were higher than outside it, but the difference on these occasions was small.

A logical explanation of the higher temperatures in the unworked soil is that the greater amount of dark colored organic matter on the surface absorbs more heat than the lighter colored, bare mineral soil.

POWER SAW PRUNING

The Forest Products Laboratory is experimenting with a power-driven pruning saw, which gives promise of reducing the cost of this operation materially. Limbs which remain sticking out from the trunk of trees cause knots and these knots degrade the lumber. Pruning dead limbs and even a few green limbs in certain cases greatly increases the value of the products which can be cut from the trees, because clear lumber will be put on as soon as the scars from the pruning have healed. However, pruning is a costly operation and therefore it is not always actually a profitable one. The saw being developed by the Forest Products Laboratory consists of a one cylinder gasoline motor mounted on a light drag and a pole with a circular saw at the top. The pole is connected with the motor by a 15 foot length of flexible shafting. The pole is a hollow aluminum casing inside of which a shaft revolves at high speed. This shaft drives the 6-inch circular saw at the top of the pole. Some tests have been made which indicate that two men can cover about twice as much area as they could if doing the work with hand saws. Further developmental work is being done to perfect this unit, so that it will be usable under a wide variety of conditions.

NEW LAW IN WISCONSIN

In recent years many states have passed laws prescribing special regulations for the taxation of timber land. These have usually been designed to reduce the tax burden on cut-over lands, and also on lands still supporting merchantable stands of timber. These laws ordinarily demand that the owner assert his intention of managing his land for the continuous production of forest products; and in some cases, the owner is required to prove the sincerity of his intention by adequately protecting his land from fire and by making some provision to secure reproduction. Wisconsin is the first state to apply this same type of legislation to farm wood lots. The "Cashman Bill" has been passed by the legislature and signed by Governor LaFollette. The purpose of the law is to encourage the maintenance of farm wood lots and particularly those on steep slopes, which are of greater value in reducing erosion and run-off in the fertile agricultural areas below. The bill provides that no taxes shall be levied on farm wood lots that are protected from grazing and fire, and that aggregate not exceeding 25% of the total area of the individual farm. Another clause declares that land having a slope greater than 30% shall not be taxed provided such land is protected from grazing and managed in such a manner as to encourage the growth of some type of vegetative cover.

This law should be a valuable instrument for the maintenance of good cover conditions on lands which are in strategical positions for the prevention of erosion and run-off.

A METHOD OF ESTIMATING A DEFICIENCY OF AVAILABLE PHOSPHORUS

A very interesting study of the relation between the phosphorus content of the soil and concentration of this same element in the leaves of trees has been presented by Harold T. Mitchell.* The soil under a stand of mixed hardwoods, chiefly red oak, chestnut oak and red maple in New York state was supplied with varying amounts of rock phosphate in May, 1934. This soil was known to be deficient in phosphorus. Three plots were treated with the phosphate and one left for a check.

In October of the same year, leaves of the various species were collected and analyzed to determine their phosphorus content. This element has a tendency to be distributed unequally throughout a plant, particularly when the available supply is deficient in which case the leaves near the top of the plant have a higher concentration than those at the base. In order to secure comparable values for all the plants, the leaves selected for analysis were all picked from the ends of the branches near the top of the crown on its south side.

A very high degree of correlation (correlation coefficient S .992) was found between the units of rock phosphate. The relationship is linear when represented graphically. This high degree of correlation means that the available phosphorus content of the soil can be quite accurately estimated by determining the phosphorus content of the leaves. The difference between the content as estimated by this test and an optimum value tentatively set at three units is the amount which should be added to the soil. Unfortunately the author neglected to state what his "unit" of phosphate was and it would be necessary to determine this before attempting to apply the test.

It is also probable that other species might show different numerical relationships but they should be equally strong which is the important factor in judging their usefulness for estimating purposes. The high correlation obtained in this study is very striking, and is encouraging to further work along these lines.

A NEW DISEASE OF NORWAY PINE

A new disease of Norway pine is reported by J. R. Hansbrough in "Science", April 26, 1935. The disease is caused by *Tympanis pinastri*. It was first located in red pine plantations near New Haven, Connecticut, where a number of trees were found to have been killed by this organism.

The disease is characterized by the appearance of axially elongated stem cankers with depressed centers. The fruiting bodies are glistening, black, cartilaginous structures of small size, usually less than 1 mm. in height and breadth.

So far the disease has appeared only in plantations and is more prevalent in pure stands than in mixtures. It is not restricted to poor sites but it is definitly associated with the weaker trees. It has been fairly well established that the incidence of the disease was correlated with the severe drought of 1930 in southern New England. It is thought that another period of infection need not be expected until another serious drought occurs.

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*"A Method for Determining the Nutrient Needs of Shade Trees with Special Reference to Phosphorus," by Harold T. Mitchell - Black Rock Forest Papers Vol. 1, No. 1, April, 1935.

INFORMATION ON A COMMON ROT

The New York State College of Forestry at Syracuse University has recently published a bulletin* dealing with the biology of *Fomes pini* which is the fungus causing a number of well known and very extensive rots in conifers. The results of a careful study of the life history of the fungus are given.

The fungus produces different types of decay on different hosts. On white pine the fungus causes an evenly distributed reddening of the heartwood and the formation of a few small, elongated white pockets in the advanced stage of decay; this condition is familiarly known as red rot. On red spruce the action of the fungus results in a honeycombed appearance of the heartwood caused by very numerous white pockets. Such areas are surrounded by a narrow reddened zone of incipient decay. This type of rot is called pocket rot and is as familiar in spruce as the red rot in white pine. On western yellow pine the decay produced by this same fungus tends to follow certain annual rings. This results in the destruction of concentric cylinders of wood with intervening sound areas. This condition is known as ring scale.

From the standpoint of forest management the most important facts determined about this fungus relate to its habits of disseminating spores. Observation of the number of spores cast over a considerable period of time show that two periods of heavy spore casting occur each year, one in the spring and again in the late fall. Very light sporulation continues at all times when the average weekly temperature is above 32° F. These facts were determined in New York, and it is not known if exactly similar periods would exist in other climatic regions. The bearing this has on forest management practice is well stated in the bulletin; quoting: "It seems logical to expect that periods of high sporulation will also prove to be periods of greatest danger from infection. Boyce and Hole have indicated that infection usually occurs through broken branch stubs and numerous observations on this point have been recorded. The author has frequently observed conditions which would indicate this type of infection. During the periods of high sporulation, the avoidance of fresh wounds such as those made by pruning would, therefore, seem advisable. These heavy sporulation periods occur in early spring and late fall in central New York. The formulation of a definite policy for management requires further data regarding the longevity of the spores and the exact type of branch stubs which are susceptible to infection."

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*"A contribution to the Biology of Fomes Pine," by W. Clement Percival. Technical publication No. 40 of the New York College of Forestry at Syracuse University.

EFFECTS OF BURNING AND PASTURING ON THE WATER ABSORPTION OF FOREST SOILS

The Central States Experiment Station has lately extended its study of the water absorption of soils to include sandy soils of a coarser texture than were covered in the original study. The soils studied during the past summer were the cherty and sandy soils in northern Arkansas, and the yellow silt loams in southern Illinois. The soils studied in Arkansas are representative of the Ozark forest region of Missouri and Arkansas, while the other group is typical of the unglaciated loess — mantled areas of southern Illinois, southern Indiana and southeasten Ohio.

The results of this part of the study are presented in a mimeographed "Station Note" No. 16, of the Central States Station. Briefly, the study showed that burning and pasturing greatly decreased the water absorption capacity of even these relatively coarse-textured soils.

The absorption capacity was evaluated by applying four successive one liter portions of water and measuring the rate of absorption in cubic centimeters per square foot.

The results of this study, together with those of the original part of the work, show very convincingly that forest cover greatly increases water absorption and retards run-off. On silt, loam and clay soils it is most significant.

GOVERNOR'S CONSERVATION CONFERENCE

The Lake States Conservation Conference was held in Madison, Wisconsin, on April 24 and 25, for the purpose of discussing methods of more efficiently expediting and controlling the expenditure of public funds on conservation projects of all sorts. The meeting was called by Governor LaFollette and the Governors of Michigan and Minnesota were invited. It was attended by representatives of the State Conservation Departments, State Planning Boards, the Forest Schools, and the Forest Service.

The conference reached the conclusion that federal conservation activies in the three states should be administered by one authority and that the state activities should also be controlled by a single authority in each state. These two agencies would then authorize all conservation projects without the necessity for reference to Washington.

An interesting aftermath of this conference is that the National Emergency Council has allotted money directly to the State of Wisconsin for conservation purposes.

NATURAL VEGETATION MAP OF THE LAKE STATES

The accompanying map is a revision of the Lake States portion of Shantz and Zon's map of the Natural Vegetation of the United States*. Since the natural vegetation is the cover which will develop under the normal operation of the natural factors (soil, climate, fire, wind, insects, etc.), peculiar to a given area, the map does not portray present cover which is largely the result of human action. The map is based on observation and to a considerable extent, on the natural relation between forest cover and soils.

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*Shantz, H. L. and Zon, R. 1924. Atlas of American Agriculture. Part 1, Sect. E. Natural Vegetation.

NATURAL VEGETATION OF THE LAKE STATES